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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/729,574	12/04/2003	Thomas G. Anderson	010-03-002	2289

7590 05/20/2005
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EXAMINER

BASOM, BLAINE T

ART UNIT PAPER NUMBER

2173

DATE MAILED: 05/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/729,574

Applicant(s)

ANDERSON, THOMAS G.

Examiner

Blaine Basom

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 January 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-32 and 34-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-32 and 34-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 December 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Response to Arguments***

The Examiner acknowledges the Applicants' amendments to claims 3, 14, 5, 6, 13, and 32, the Applicants' cancellation of claims 1, 2, and 33, and the Applicants' addition of new claims 34-38. Regarding claims 3, 4-13, 15-24, 26-32, and 34, the Applicants argue that Rosenberg (U.S. Patent No. 6,219,032 to Rosenberg et al.) fails to teach communicating forces to the user, based on interactions with an application, while the user moves an input device along a device fundamental path. In response, the Examiner respectfully notes that none of the claims recite communicating forces to the user, while the user is moving an input device along a device fundamental path. The Applicants' arguments are therefore moot. However, assuming such a limitation is expressed in the claims, the Examiner notes that Rosenberg teaches applying forces to an input device, while the user moves the input device along a device fundamental path, as is shown below.

Further regarding claims 3, 4-13, 15-24, 26-32, and 34, the Applicants argue that the cursor of Rosenberg is not an "object" in an application, like claimed. The Examiner respectfully disagrees. As known in the art and demonstrated by Rosenberg, a cursor is a displayed graphical object (e.g. an arrow) used to interact with an application, and is therefore considered an object in an application. Even assuming that a cursor does not constitute such an object (an idea with which the Examiner does not necessarily agree), the Examiner notes that the scroll bar thumb taught by Rosenberg may be considered such an object, as is shown below, to read on at least independent claim 3.

Concerning claim 4, the Applicants argue that Rosenberg fails to teach that forces applied to an input device correspond to momentum and inertia of an object in an application. The Examiner respectfully disagrees, particularly for the reasons described below in the rejection of claim 4.

As per claims 5 and 6, the Applicants argue that Rosenberg fails to teach that the shape of an object fundamental path and device fundamental path is dependent on the state of an associated application, as added by the amendments to the claims. In response, the Examiner presents the U.S. Patent of Stewart et al. (U.S. Patent No. 6,701,187), which as shown below, teaches such features.

Regarding claim 9, the Applicants assert that that there is no suggestion to combine Rosenberg with Frid-Nielson (U.S. Patent No. 5,655,093), as done in the previous Office Action. The Examiner respectfully disagrees. Briefly, Frid-Nielson teaches a more user-friendly way of implementing cursors. The system of Rosenberg comprises cursors. Therefore it would have been obvious to combine the two references in order to have user-friendlier cursor control in the system of Rosenberg.

In reference to claim 15, the Applicants assert that there is no suggestion to combine Rosenberg with Gould (U.S. Patent No. 6,583,782), as done in the previous Office Action, since Gould teaches that differing device and cursor paths are desirable as an alternative to actual forces, like those implemented by Rosenberg. The Examiner respectfully disagrees. It is understood that at the time the invention was made, it was known that differing device and cursor paths may complement actual forces in a haptic interface (for example, see column 26, lines 9-41 of U.S. Patent No. 6,288,705 to Rosenberg et al.). Accordingly, it is understood that

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one, at the time the invention was made, would have been motivated to combine Rosenberg and Gould.

Regarding new claim 34, the Applicants submit that all the paths of Rosenberg require a one to one correspondence. In response, the Examiner presents the U.S. Patent of Rosenberg II (U.S. Patent No. 6,288,705), which as shown below, teaches not have a one to one correspondence between a device fundamental path and an object fundamental path.

Referring to claim 19, the Applicants assert that Rosenberg does not teach changing a characteristic of a cursor in response to movement of the input device off the device fundamental path. The Examiner respectfully disagrees. Claim 19 fails to specify any detail regarding how the interface object is changed, reciting only that a “characteristic” of the object is changed. Such a characteristic could pertain to, for example, the speed of the object, a physical characteristic of the object, or in this case, information associated with the object. Rosenberg discloses that movement of the input device off the device fundamental path results in a command gesture (for example, see column 45, line 61 – column 46, line 19). This command gesture is considered a characteristic of the cursor.

As per claim 29, the Applicants assert that Rosenberg does not teach a motion initiation signal derived from a combination of a cursor position and a user-actuated switch. The examiner respectfully disagrees, as is described below in the rejection for claim 29. Additionally, and in regard to claims 31 and 38, the Applicants assert that neither Rosenberg nor Baynton (U.S. Patent No. 6,277,030) teaches applying forces from interaction with objects in an application, and that the object fundamental path and device fundamental paths may have different shapes.

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The Examiner respectfully disagrees, specifically for the reasons described below in the rejections for claims 31 and 38.

Regarding claims 14 and 25, the Applicants assert that Rosenberg fails to teach applying a force to the input device to urge it to a specific region of the device's range of motion, a region from which uninterrupted motion along a device fundamental path is possible, as has been added to the claim. In response, the Examiner presents the U.S. Patent of Rosenberg II (U.S. Patent No. 6,288,705), which as shown below, teaches such a feature. The Applicants arguments with respect to claim 14 have thus been considered but are moot in view of the new grounds of rejection presented below.

Regarding new claims 35-37, the Applicants assert that Rosenberg does not teach of simulations of physical objects, as expressed in the claims. In response, the Examiner presents the U.S. Patent of Stewart, which as shown below, teaches such a feature.

The Applicant's arguments filed 1/10/2005 have thus been fully considered, but are not persuasive.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 3-4, 7-8, 11-13, 19-24, 26-29, and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,219,032, which is attributed to Rosenberg et al. (and hereafter referred to as “Rosenberg”). In general, Rosenberg presents a human/computer interface device in conjunction with a graphical user interface, whereby the interface device is used to affect the motion of a cursor, and other objects, which are displayed in the graphical user interface. Force feedback is provided to the interface device in order to inform the user of graphical objects encountered by the cursor (see column 2, line 53 – column 3, line 6). Consequently, Rosenberg is considered to teach a method, implemented within a human-computer interface, for allowing a user of a haptic input device to affect the motion of an object in a computer application.

Specifically regarding claim 3, Rosenberg describes a particular type of force feedback applied to the interface device, namely a “groove” force. According to Rosenberg, this groove force provides a detent sensation along a line – to make the interface device feel like it is captured in a groove (see column 38, line 38 – column 39, line 9). While the interface device moves along this groove, no force is applied to the device. However, if the interface device attempts to move out of the groove, a force is applied resisting the device’s movement out of the groove (see column 38, line 38 – column 9, line 39). Rosenberg discloses that a groove force

can be applied to a cursor, such that when the cursor is moved into a groove, resistive forces are applied to resist movement out of the groove, but freely allow movement along the length of the groove (see column 57, line 30 – column 58, line 8). This groove force is considered applicable to other user interface objects, as well as a cursor. For example, a groove force may also be applied to a scroll bar or slider “thumb” such that the user is freely able to drag the thumb along the length of the scroll bar, but movement out of the scroll bar is resisted (see column 59, line 49 – column 50, line 39). Consequently, a groove is considered an “object fundamental path,” like that of the claimed invention, as it represents a path of motion of an object in a computer application. Since the position of the interface device corresponds to the position of the object (see column 2, line 67 – column 3, line 7), Rosenberg is also considered to teach establishing a device fundamental path, representing a path of the interface device, and corresponding to the groove. The object, such as a cursor or scroll bar thumb, is moved along the groove in response to a component of input device motion along the device fundamental path, and a resistive force is applied to the interface device in response to a component of input device motion not along the device fundamental path. Additional forces may be applied to the interface device in response to interaction of the object, i.e. the cursor or scroll bar thumb, with the application (for example, see column 44, line 65 – column 45, line 21). For example, within a scroll bar associated with a groove force, forces may be applied to the input device in response to dragging the scroll bar thumb via the cursor (see column 59, line 49 – column 60, line 62).

In reference to claim 4, Rosenberg teaches applying forces to the interface device corresponding to the motion of the object in an application, wherein the forces provide a perception of momentum and inertia of the input device corresponding to the momentum and

inertia of the object. For example, Rosenberg discloses that the above-described thumb may have a simulated mass, such that the user feels the inertia of the thumb when dragging it with a cursor (see column 59, line 49 – column 60, line 29). Rosenberg similarly discloses that the cursor itself may have a simulated mass, which may be used to apply appropriate force feedback to the interface device in response to interaction of the cursor with objects within the graphical user interface (see column 60, lines 46-62).

In regard to claim 7, Rosenberg teaches that a cursor may interact with an application, wherein the interaction of the cursor with the application is dependent on the speed of the cursor (for example, see column 60, lines 30-62). It is therefore understood that a cursor may interact with the application, dependent upon the speed of the cursor, particularly as the cursor moves along a groove.

Referring to claim 8, Rosenberg teaches displaying a visual representation of a cursor, i.e. object, to the user, particularly within a graphical user interface (for example, see column 2, line 60 – column 3, line 11).

With respect to claim 11, the cursor of Rosenberg is considered to comprise two representations: a visual representation that is used in a display to provide visual feedback to the user (for example, see column 2, line 60 – column 3, line 3), and an interaction representation that is used with the interface device to provide force feedback to the user (for example, see column 60, lines 30-62).

Concerning claim 12, Rosenberg describes a groove, such that if an interface device attempts to move out of a device fundamental path corresponding to the groove, a force is applied resisting the device's movement, as is described above. This force has a first magnitude

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for a first position of the interface device a first distance from the device fundamental path, and a second, larger magnitude for a second position of the interface device a second, larger distance from the device fundamental path (see figure 15, in addition to its description in column 38, line 38 – column 39, line 9).

Regarding claim 13, Rosenberg teaches applying a “capture” or “barrier” force along a device fundamental path corresponding to a groove, wherein the force apposes motion of an interface device beyond an end of the device fundamental path (for example, see figure 21, and its corresponding description in column 59, line 65 – column 60, line 8).

Regarding claims 19 and 20, Rosenberg describes a groove, such that if an interface device attempts to move out of a device fundamental path corresponding to the groove, a force is applied resisting the device’s movement, as is described above. In other words, Rosenberg teaches that the force resists motion of the interface device off the device fundamental path along a first dimension. Additionally, Rosenberg teaches that a characteristic of an object in the application may be responsive to motion of the interface device off the device fundamental path along a second dimension, different from the first dimension. For example, a “command gesture” may be applied to the object in response to movement of the interface device along this second dimension (see column 45, line 61 – column 46, line 19).

Regarding claims 21 and 22, Rosenberg describes a groove, such that if an interface device attempts to move out of a device fundamental path corresponding to the groove, a force is applied resisting the device’s movement, as is described above. Additionally, Rosenberg discloses that a force may be applied to the interface device in response to the position of the cursor along the groove (for example, see column 60, lines 2-23), and in response to the

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interaction of the cursor with the application (for example, column 60, lines 24-62). The magnitude of the force applied to the interface device is thus partially dependent on the position of the cursor along the groove, i.e. object fundamental path, and partially dependent on the interaction of the cursor with the application.

Concerning claims 23 and 24, Rosenberg discloses that the magnitude of the force resisting the interface device's motion off of the device fundamental path is partially dependent on a parameter of the interface, namely a "magnitude parameter" (for example, see column 38, lines 38-53). As a major goal of such force feedback is to assist the user in targeting graphical user interface objects (see column 44, lines 50-64), this magnitude parameter is considered a "user-assistance parameter," like recited in claim 23. Additionally, Rosenberg discloses that the user may adjust such parameters to suit his or her needs (for example, see column 52, lines 54-59). The magnitude parameter may thus be established by a measure of the user's proficiency in manipulating the interface device.

With respect to claims 26, 28, and 29, Rosenberg discloses that a groove force may be an internal force, meaning that it is established once the user positions a cursor within a region associated with the groove (see column 3, lines 37-49; and see column 59, line 49 – column 60, line 13). Rosenberg thus teaches determining when the user establishes a motion-initiation signal, specifically by determining when the user positions a cursor within a region associated with a groove. The positioning of the cursor within the region associated with the groove is understood to comprise a switch actuated by the user. For example, the input device itself may comprise a switch to detect its movement and position, or, software implementing the method of Rosenberg may comprise some sort of switch construct to determine output force in response to

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the position of the cursor. In response to detecting the motion initiation signal, an object fundamental path i.e. a groove, is established. As this groove is associated with a corresponding device fundamental path, it is understood that a device fundamental path is additionally established according to a defined path, namely this groove, and a position of the cursor when the motion-initiation signal was supplied.

Concerning claims 27 and 30, Rosenberg teaches determining when the user establishes a motion-initiation signal, specifically by determining when the user positions a cursor within a region associated with a groove, as is described in the previous paragraph. The motion-initiation signal thus comprises motion of the cursor to a defined range of the cursor's motion, or in other words, motion of the input device having defined characteristics.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 3, 5, 6, 35, and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,801,187, which is attributed to Stewart et al. (and hereafter referred to as "Stewart"). In general, Stewart describes a haptic interface for reviewing and manipulating a geometric model, for example, as found in a CAD application (see column 1, line 15 – column 2, line 62). Stewart particularly teaches establishing and displaying on a display system the geometric model, in addition to a visual representation of the user's haptic input device (see

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column 5, lines 44-61; and figure 3). This geometric model, as displayed on the display system, is considered an object fundamental path since it designates a path that the visual representation of the input device follows in order to “feel” the geometric object represented by the model. Additionally, Stewart discloses that a “virtual surface” is established, which corresponds to the geometric model, and represents the path the input device must follow in order to “feel” the geometric model (see figure 3; in addition to column 4, line 21 – column 6, line 12). Such a virtual surface is therefore considered a device fundamental path. Stewart discloses that a force is applied to the haptic input device in order to constrain the user’s hand onto the virtual surface (for example, see column 4, line 41 – column 6, line 38). Accordingly, Stewart is considered to teach moving the visual representation of the input device in the computer application along the object fundamental path responsive to a component of haptic input device motion along the device fundamental path, and applying a force to the haptic input device responsive to a component of haptic input device motion not along the device fundamental path. As stated above, Stewart also teaches that the user, via the haptic input device, may modify the geometric model (for example, see column 7, lines 13-38). It is understood that in doing so force feedback is applied to the haptic input device, and thus, a force is applied to the haptic input device responsive to interaction of the object with other objects in the application. Moreover, since the geometric model is modified by the user’s edits, the object and device fundamental paths representing this model, it is understood that the shape of the object fundamental path and the device fundamental path is similarly modified. Stewart thus teaches that the application may comprise a plurality of states, each being associated with particular user edits of the geometric

model, and wherein the shape of the object fundamental path and the device fundamental path is dependent on the state of the application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over the U.S. Patent of Rosenberg, which is described above, and also over U.S. Patent No. 5,655,093, which is attributed to Frid-Nielson. As shown above, Rosenberg teaches a method like that recited in claim 8, wherein particularly, an object fundamental path, namely a groove, is established to represent a path of motion of an object in a computer application, and a corresponding device fundamental path is established to represent a path an interface device must take in order to move the object along the object device fundamental path. This object may be, for instance, a cursor displayed within a graphical user interface, and the object fundamental path may be defined by a groove applied to a scroll bar, such that the user is freely able to move the cursor along the length of the scroll bar, but movement out of the scroll bar is resisted (see column 59, line 49 – column 50, line 39). As the device fundamental path represents a path the interface device must take in order to move the cursor along the groove – the scroll bar in this case – it is understood that when the device is not on the device fundamental path, the cursor is not within the bounds of the

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scroll bar. Rosenberg, however, does not explicitly disclose that the cursor on the scroll bar is perceptively different from the cursor off the scroll bar, or in other words, that the cursor when the device is on the device fundamental path is perceptively different from the cursor when the device is not on the device fundamental path, as is expressed in claim 9.

Like Rosenberg, which teaches providing force feedback in response to graphical objects encountered by the cursor, Frid-Nielsen teaches providing feedback to the user in response to graphical objects encountered by the cursor. Frid-Nielsen particularly teaches adjusting the depiction of the cursor to provide information about which user inputs are available on the objects encountered by the cursor. For example, and regarding the claimed invention, Frid-Nielsen discloses that the appearance of the cursor may be altered when it is placed on a scroll bar, the altered appearance indicating valid inputs of the user interface device (See column 8, lines 29-48).

Therefore, it would have been obvious to one of ordinary skill in the art, having the teachings of Rosenberg and Frid-Nielsen before him at the time the invention was made, to modify the cursor of Frid-Nielsen, such that it changes its appearance when placed on a scroll bar, or in other words, such that the cursor when the device is on the device fundamental path is perceptively different from the cursor when the device is not on the device fundamental path. It would have been advantageous to one of ordinary skill to utilize such a combination because such a modifiable cursor image provides information about system commands to the user, thus creating a more intuitive user interface, as is taught by Frid-Nielsen (see column 3, lines 31-39).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the U.S. Patent of Rosenberg, which is described above, and also over U.S. Patent No. 6,191,785, which is attributed to Bertram et al. (and hereafter referred to as "Bertram"). As described above, Rosenberg teaches a method like that described in claim 3, whereby the method may particularly be applied to a scroll bar to comprise: establishing an object fundamental path, i.e. a groove, representing the path of motion of a scroll bar "thumb;" establishing a device fundamental path in correspondence with the groove; detecting motion of an interface device; moving the thumb in the computer application along the groove responsive to a component of interface device motion along the device fundamental path; and applying a force to the input device responsive to a component of interface device motion not along the device fundamental path, and responsive to interaction of the thumb with the application. Rosenberg, however, does not explicitly disclose that additional object fundamental paths may be established, as is expressed in claim 10.

Like Rosenberg, Bertram discusses scroll bars (for example, see column 1, line 19 – column 2, line 13). Regarding the claimed invention, Bertram teaches that a graphical user interface may comprise a plurality of scroll bars, each having a thumb (for example, see the scroll bars represented by reference numbers 64 and 70 in figure 3).

Therefore, it would have been obvious to one of ordinary skill in the art, having the teachings of Rosenberg and Bertram before him at the time the invention was made, to modify the interface by Rosenberg to include a plurality of scroll bars, as done by Bertram. It would have been advantageous to one of ordinary skill to utilize such a combination because a plurality of scroll bars allow the user to scroll the display in more than one dimension, such as for example, they allow the user to scroll both horizontally and vertically, as is demonstrated by

Bertram. Thus with the method of Rosenberg applied to a plurality of scroll bars, each scroll bar having a “groove” associated therewith, a second object fundamental path, i.e. groove, representing the path of motion of a second thumb is established; a second device fundamental path in correspondence with the second groove is established; it is determined if either fundamental path is active, or in other words, if the user has selected one of the thumbs using a cursor; the selected thumb is moved along its associated groove responsive to a component of interface device motion along the active device fundamental path; and a force is applied to the interface device responsive to a component of interface device motion not along the active device fundamental path.

Claims 14 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the U.S. Patent of Rosenberg, which is described above, and also over U.S. Patent No. 6,288,705, which is attributed to Rosenberg et al. (and hereafter referred to as “Rosenberg II”). Regarding claim 14, Rosenberg teaches a method for allowing a user of a haptic input device to affect the motion of an object in a computer application, whereas described above the method comprises: establishing an object fundamental path representing a math of motion of the object in the computer application; establishing a device fundamental path in correspondence with the object fundamental path; detecting a motion of the haptic input device; moving the object in the computer application along the object fundamental path responsive to a component of haptic input device motion along the device fundamental path; and applying a force to the haptic input device responsive to a component of haptic input device motion not along the device fundamental path. Rosenberg, however, does not explicitly teach applying a force to the haptic

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input device to urge the haptic input device to a starting region of the range of motion of the haptic input device, whereas recited in claim 14, the starting region comprises a region of the range of motion of the haptic input device such that motion of the haptic input device along the device fundamental path starting the in starting region will not require motion of the haptic input device outside its range of motion.

Like Rosenberg, Rosenberg II similarly describes a haptic user interface (for example, see column 5, line 56 – column 6, line 9). Rosenberg II particularly notes that in such haptic interfaces, various points on the display may become unreachable via the range of motion of the haptic input device (for example, see column 4, lines 37-64; and column 29, line 31 – column 30, line 14). Rosenberg II alleviates this problem via various embodiments, each applying a force to the haptic input device, either automatically or by the user, to urge the haptic input device towards a particular region of the range of motion of the haptic input device, such that movement of the haptic input device starting in this particular region will not require movement of the haptic input device outside its range of motion (for example, see column 30, line 47 – column 32, line 43; and column 37, lines 44-61). Such a particular region is considered a “starting region,” like that recited in claim 14.

Consequently, it would have been obvious to one of ordinary skill in the art, having the teachings of Rosenberg and Rosenberg II before him at the time the invention was made, to modify the haptic interface taught by Rosenberg, such that forces may be applied to the haptic input device to prevent it from reaching the limits of its range of motion, as is taught by Rosenberg II and described above. It would have been advantageous to one of ordinary skill to utilize this combination because if the input device reaches its limits, it reduces the realism

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provided by the force feedback, as is taught by Rosenberg II (for example, see column 4, lines 37-64).

In reference to claim 25, Rosenberg teaches defining a motion-initiation region, namely a “force field,” which comprises a portion of the interface device range of motion (see column 40, lines 21-41). In response to determining that the input device is within this force field, an “attractive” force may be applied to the device urging it to a device fundamental path corresponding to a groove (see column 59, lines 49-63).

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over the U.S. Patent of Rosenberg, which is described above, and also over U.S. Patent No. 6,583,782, which is attributed to Gould et al. (and hereafter referred to as “Gould”). As shown above, Rosenberg teaches a method like that recited in claim 3, wherein particularly, an object fundamental path, namely a groove, is established to represent a path of motion of an object in a computer application, and a corresponding device fundamental path is established to represent a path an interface device must take in order to move the object along the object device fundamental path. This object may be, for instance, a cursor displayed within a graphical user interface. Rosenberg, however, does not explicitly disclose that the device fundamental path has a different shape than the object fundamental path, as is recited in claim 15.

Like Rosenberg, wherein force feedback is provided to the interface device in response to graphical objects encountered by the cursor, Gould teaches providing “virtual force feedback” to the user in response to graphical objects encountered by the cursor (for example, see column 6, lines 42-62). Such virtual force feedback is applied by affecting the movement of the cursor,

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relative to the movement of the interface device (see column 8, lines 31-42). For example, Gould discloses that such virtual force feedback can be applied to a thumb or an elliptical selector wheel displayed within a graphical user interface (See column 16, lines 5-24). Virtual force feedback, similar to the groove force described by Rosenberg, may be applied to keep the cursor on the wheel. However in the case of virtual force feedback, the user does not have to move the input device in the exact circular shape of the wheel in order to keep the cursor on the wheel – the cursor is maintained on the wheel in response to attractive and repelling virtual forces provided by the wheel. Thus regarding the claimed invention, Gould teaches that the path in which the cursor moves on the screen, i.e. the object fundamental path, may have a different shape than the path in which the interface device moves, i.e. the device fundamental path (for example, see figure 10A, and its corresponding description in column 16, lines 48-60).

Therefore, it would have been obvious to one of ordinary skill in the art, having the teachings of Rosenberg and Gould before him at the time the invention was made, to modify the graphical user interface taught by Rosenberg to include virtual force feedback, or in other words, such that the device fundamental path does not have to be the same shape as the object fundamental path, as is taught by Gould. It would have been advantageous to one of ordinary skill to utilize such a combination because such virtual force feedback reduces “background mechanical noise” as is taught by Gould (see column 6, line 63 – column 7, line 3). Background mechanical noise may reduce productivity, even with force feedback devices like that of Rosenberg (see column 2, lines 4-9; and column 1, lines 31-41 of Gould).

Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Rosenberg and Gould, which is described above, and also over U.S. Patent No. 6,552,722, which is attributed to Shih et al. (and hereafter referred to as “Shih”). As described above, Rosenberg and Gould teaches a method like that described in claim 15, whereby a device fundamental path is established, in correspondence with a defined “groove,” to represent a path of movement of an interface device. While Rosenberg discloses that the groove, and consequently the corresponding device fundamental path, may be defined along a given degree of freedom of the interface device (see, for example, column 32, lines 44-55; and column 38, lines 38-51), neither Rosenberg nor Gould explicitly disclose that the device fundamental path defines a curve in three-dimensions, a curve in two-dimensions, or a surface in three-dimensions, as is recited in claims 16-18, respectively.

Like Rosenberg, Shih teaches establishing an object fundamental path, which is defined by a “geometric constraint,” and which represents a path of motion of a “virtual tool” object in a user interface (see the abstract of Shih). As a haptic interface device is used to affect the motion of the virtual tool in the interface (see the abstract of Shih), a corresponding device fundamental path representing the path of motion required by the interface device to move the virtual tool along the object fundamental path is considered to be likewise established. As also done by Rosenberg, a force is applied to the interface device of Shih responsive to a component of input device motion not along this device fundamental path (for example, see column 37, line 41 – column 38, line 11). Regarding the claimed invention, Shih teaches that the object fundamental path, and consequently its corresponding device fundamental path, as defined by a geometric constraint, may define a point, line, curve, surface, or space representation, understood to be

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within two- or three- dimensions (for example, see column 37, lines 15-40; and column 8, line 21 – column 8, line 23).

It would have therefore been obvious to one of ordinary skill in the art, having the teachings of Rosenberg, Gould, and Shih before him at the time the invention was made, to modify the device fundamental path taught by Rosenberg and Gould such that it defines a curve in three-dimensions, defines a curve in two-dimensions, or defines a surface in three-dimensions, as is done by Shih. It would have been advantageous to one of ordinary skill to utilize such a combination because such device fundamental paths are applicable in a plurality of applications, specifically CAD applications, as is taught by Shih (for example, see column 1, line 61 – column 2, line 9). Modifying Rosenberg and Gould by Shih would thus create a more general, and more useful, technique for providing feedback.

Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Rosenberg and Gould, which is described above, and also over Rosenberg II, which is additionally described above. As described above, Rosenberg and Gould teach a method like that of claim 15, whereby a device fundamental path and an object fundamental path, representing the path of an input device and a corresponding display object, respectively, may have different shapes. Neither Rosenberg nor Gould, however, explicitly disclose that the correspondence between the device fundamental path and the object fundamental path is not one to one, as is recited in claim 34.

Like Rosenberg and Gould, Rosenberg II describes a device fundamental path and an object fundamental path, representing the path of an input device and a corresponding display

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object, respectively. Regarding the claimed invention, Rosenberg II discloses that the device fundamental path and the object fundamental path may comprise different shapes (for example, see column 26, lines 9-41), and that the correspondence there between may not be one to one (for example, see column 18, line 60 – column 19, line 17).

It would have therefore been obvious to one of ordinary skill in the art, having the teachings of Rosenberg, Gould, and Rosenberg II before him at the time the invention was made, to modify the correspondence between the device fundamental path and the object fundamental path, as is done by Rosenberg II. It would have been advantageous to one of ordinary skill to utilize this combination because, not having a one to one correspondence between the device fundamental path and the object fundamental path can compensate for differences in size between the display space and the range of movement of the input device, as is taught by Rosenberg (for example, see column 18, line 60 – column 19, line 17).

Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,220,963, which is attributed to Meredith, and also over the U.S. Patent of Rosenberg, which is described above. In general, Meredith describes a computerized pool cue input device for use with computer-simulated games of pool (see column 2, lines 6-13). The movement of this input device results in corresponding movement of a displayed object, namely the tip of a cue stick, on a computer display (see column 5, lines 16-30). Thus regarding claim 32, Meredith discloses: a computer application which comprises a pool simulation; an object in the in the computer application, wherein the object comprises a pool cue; an object fundamental path representing a path of motion in the computer application, wherein the object fundamental path comprises a

path suited for perception of the motion of a pool cue. In response to detecting the motion of the input device, i.e. computerized pool cue, the object in the application is moved along the object fundamental path responsive to a component of input device motion along the device fundamental path. Meredith, however, does not explicitly teach establishing an object fundamental path and a device fundamental path, such that a force is applied to the input device responsive to a component of input device motion not along the device fundamental path, as is recited in claim 3, upon which claim 32 depends.

As described above, Rosenberg teaches establishing an object fundamental path, namely a groove, and a corresponding device fundamental path, such that an object in an application is moved along the object fundamental path responsive to a component of input device motion along the device fundamental path, and such that a force is applied to the input device responsive to a component of input device motion not along the device fundamental path. Moreover, Rosenberg teaches that such a force may be applied to a computerized pool cue input device (for example, see column 13, line 65 – column 14, line 9).

Consequently, it would have been obvious to one of ordinary skill in the art, having the teachings of Meredith and Rosenberg before him at the time the invention was made, to modify the input device and simulation taught by Meredith such that force feedback is applied to the input device response to input device motion not along an established device fundamental path, as is done by Rosenberg. It would have been advantageous to one of ordinary skill to utilize such a combination because such force feedback can reduce the difficulty of required “targeting” tasks, thus facilitating interaction with the computer application, particularly for users having

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dexterity-debilitating conditions, as is taught by Rosenberg (for example, see column 44, lines 50-64).

Claims 31 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,277,030, which is attributed to Baynton et al. (and hereafter referred to as “Baynton”), and also over the combination of Rosenberg and Meredith, which is described above. In general, Baynton describes a computerized golf swing apparatus, which provides force feedback to correct a user’s golf swing (for example, see the abstract). Baynton more specifically teaches: establishing a device fundamental path, namely a predetermined golf swing path; detecting motion of an input device; and applying force to the input device responsive to a component of the input device motion not along the device fundamental path (see column 3, lines 17-52). However, Baynton does not explicitly teach implementing such a golf swing apparatus as an input to an application comprising a golf simulation, as is expressed in claim 31. Baynton therefore does not teach: establishing an object fundamental path representing a path of motion of an object in the computer application, wherein the object comprises a golf club, wherein the object fundamental path comprises a path suited for perception of the swing of the golf club, and wherein the object moves along the object fundamental path responsive to a component of input device motion along the device fundamental path, as is expressed in claims 3 and dependent claim 31. Moreover, Baynton does not teach that the object fundamental path and the device fundamental path have different shapes, as is recited in claim 38.

Similar to Baynton, Rosenberg and Meredith teach implementing an input apparatus, which comprises a pool cue, and which provides for feedback to the user. Rosenberg and

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Meredith particularly teach implementing such an apparatus as an input to an application comprising a pool simulation by: establishing an object fundamental path representing a path of motion of an object in the computer application, wherein the object comprises a pool cue, wherein the object fundamental path comprises a path suited for perception of the motion of the pool cue, wherein the object moves along the object fundamental path responsive to a component of input device motion along the device fundamental path; and wherein force is applied to the input apparatus in response to interaction of the object with other objects in the application. It is understood that the object fundamental path and the device fundamental path may have different shapes, with discrepancies caused by, for example, distortions in the display screen displaying the object.

It would have been obvious to one of ordinary skill in the art, having the teachings of Baynton, Meredith, and Rosenberg before him at the time the invention was made, to modify the input device taught by Baynton such that it is implemented in a golf simulation, analogous to the pool simulation of Meredith and Rosenberg. In other words, it would have been obvious to modify the golf swing apparatus of Baynton such that it serves as an input to an application comprising a golf simulation, specifically by: establishing an object fundamental path representing a path of motion of an object in the computer application, wherein the object comprises a golf club, wherein the object fundamental path comprises a path suited for perception of the motion of the golf club, wherein the object moves along the object fundamental path responsive to a component of input device motion along the device fundamental path, and wherein force is applied to the input apparatus in response to interaction of the object with other objects in the application. It would have been advantageous to one of ordinary skill to utilize this

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combination, because using the apparatus as an input to such a simulation would allow the user to view the results of his or her swing, as is demonstrated by Meredith. Thus, in addition to providing entertainment value, the simulation would allow the user to better improve his or her swing.

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over the U.S. Patent of Stewart, which is described above, and also over the U.S. Patent of Rosenberg II, which is also described above. As described above, Stewart teaches a method like that recited in claim 35, wherein an object is moved along an object fundamental path responsive to a component of haptic input device motion along a device fundamental path, and a force is applied to the haptic input device responsive to a component of input device motion not along the device fundamental path. Stewart, however, does not explicitly disclose that such movement and force response is applied in response to accepting a signal from the user indicating that such interaction is desired, as is expressed in claim 37.

Like Stewart, Rosenberg II similarly describes a haptic user interface (for example, see column 5, line 56 – column 6, line 9). Rosenberg II particularly discloses that force feedback may only be applied in response to detecting a safety switch detected by the user (see column 17, lines 46-67).

It would have been obvious to one of ordinary skill in the art, having the teachings of Stewart and Rosenberg II before him at the time the invention was made, to modify the haptic interface of Stewart to include the safety switch of Rosenberg II, such that if the switch is actuated, an object is moved along an object fundamental path responsive to a component of

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haptic input device motion along a device fundamental path, and a force is applied to the haptic input device responsive to a component of input device motion not along the device fundamental path, and such that if the switch is not activated, a cursor is simply moved corresponding to motion of the input device, with no force feedback. It would have been advantageous to one of ordinary skill to utilize this combination, because such a switch may increase the safety of the haptic interface, as is taught by Rosenberg II (for example, see column 17, lines 46-67).

Conclusion

Applicant's amendment necessitated any new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

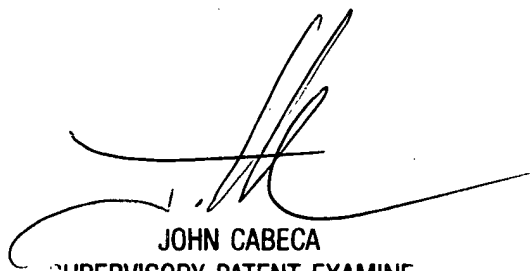
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Blaine Basom whose telephone number is (571) 272-4044. The examiner can normally be reached on Monday through Friday, from 8:30 am to 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Cabeca can be reached on (571) 272-4048. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

btb



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